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SUBJECT: SOUTH KOREA'S NUCLEAR POWER PROGRAM: STATUS
AND PROSPECTS

SUMMARY

1. This year marks the 50th anniversary of U.S.-Korea cooperation in the field of civilian nuclear energy, begun with the signing in 1956 of the bilateral Agreement for Cooperation on Civil Uses of Nuclear Energy. This fact will be commemorated during the 27th meeting of the Joint Standing Committee on Nuclear Energy Cooperation (JSCNEC) on May 1-4.

2. Korea's first commercial nuclear power reactor went into operation only in 1978, but in the intervening 28 years, Korea has risen to become the world's sixth-largest producer of nuclear power, with more than 40 percent of its electricity being supplied by 20 nuclear power plants. Korea is one of the few countries in the world committed to substantial nuclear power development in this decade, and plans to build eight new power plants over the next 10 years. This construction activity will ensure that Korean companies such as Doosan Heavy Industries are well-positioned to prosper if the global nuclear market sees a resurgence in coming years.

3. Despite its successes, Korea's nuclear energy program faces continuing challenges, including finding a solution to the problem of high-level radioactive waste disposal and public resistance. This message provides an overview of the status and prospects of the Korean nuclear power sector. End Summary.

FORUM LOOKS AT NUCLEAR POWER SECTOR

4. The Korea Atomic Industrial Forum (KAIF) and the Korea Nuclear Society (KNS) hosted their 21st joint Annual Conference in Seoul April 20-21. The theme was "Sustainable Development of Nuclear Energy: Current Issues and Challenges." The conference drew more than

400 atomic energy specialists and scientists from South Korea and 100 from abroad, including the United States, Canada, France, Germany, Japan, and Vietnam.

15. In his keynote address, Korea Hydro and Nuclear Power Company (KHNP) President Lee Joong-jae reviewed the "Current Status and Future Prospects of Nuclear Industry in South Korea." He cautiously opined that a global nuclear renaissance is coming, prompted by concern over global warming and by the rising price of oil.

16. Lee stated that the Korean nuclear industry, like those of other advanced nuclear countries, still faces significant challenges, including NGO opposition to expanding nuclear power, concerns about safety and security issues, public opposition to the siting of nuclear facilities, and the cost of nuclear power relative to other energy sources.

NUCLEAR POWER OPERATION AND PERFORMANCE

17. Korea's nuclear program began modestly, with groundbreaking in 1959 for the construction of a TRIGA Mark II research reactor partially funded by the U.S. Atomic Energy Commission. Since the first nuclear power plant was inaugurated in 1978 at Kori, the Korea Hydro and Nuclear Power Company (spun off in 2001 from the Korea Electric Power Corporation) has achieved a steady growth in nuclear power production. At present, South Korea has 20 operating nuclear power plants throughout the country. It also has four plants under construction, two units each at the Shin-Kori and Shin-

Wolsong plant sites. The four new plants will be an upgraded version of the 1,000 MWe pressurized water reactors already in service.

18. Table 1 below outlines the status of electric power generated in Korea by energy source. Power generation from nuclear reactors in 2005 reached 146,779 gigawatt hours (GWh), with a total installed capacity of 17,716 MWe. The 20 operating nuclear plants account for 28.5 percent of the nation's total electric generating capacity, but actually produce more than 40 percent of Korea's total electricity output. At present, South Korea is the world's sixth-largest producer of nuclear power.

Table 1: Status of Electric Power by Energy Source
As of yearend 2005

Energy Source	Installed Capacity (MWe)	Electricity Generation (GWh)
Nuclear	17,716 (28.5 pct)	146,779 (40.3 pct)
Coal	17,965 (28.9 pct)	133,657 (36.6 pct)
Gas	16,552 (26.6 pct)	58,250 (16.0 pct)
Oil	4,605 (7.4 pct)	17,883 (4.8 pct)
Hydro	3,885 (6.2 pct)	5,153 (1.4 pct)
Others	1,537 (2.5 pct)	3,349 (0.9 pct)
Total	62,260 (100 pct)	364,571 (100 pct)

19. One of KHNP's notable achievements has been to improve the performance of its nuclear power plants. For example, in 2005 the average capacity factor of Korean nuclear power plants was 95.5 percent, compared to the world average of 79.3 percent. According to a recent edition of "Nucleonics Week," Kori reactor unit 4 ranked first place in capacity utilization in 2005, followed by Yonggwang unit 1 and 3, Ulchin unit 1, and Wolsong unit 3. These five Korean plants topped the list of the world's 50 best plants in terms of capacity factors.

¶10. KHNP also achieved remarkable progress in reducing the average unplanned plant shutdown rate over the previous ten years, from 1.1 cases in 1995 to 0.5 cases in 2005.

¶11. Korea's nuclear power plants (NPPs) are of roughly four different designs, depending upon the supplier of the nuclear steam supply system (NSSS). The first four Kori NPPs and the four Yonggwang NPPs are pressurized light water reactors (PWRs) based on the technology of the U.S.-based company Westinghouse. The first two Ulchin plants are PWRs with the NSSS components supplied by the French firm Framatome (now Areva). All of the four Wolsong NPPs are Canada Deuterium Uranium pressurized heavy water reactors (CANDU-PHWRs) based on upon technology of the Canadian company AECL. The remaining plants are PWRs, called the Korean Standard Nuclear Power Plant (KSNP), based on technology of U.S.-based Combustion Engineering (later bought by Westinghouse).

¶12. Table 2 shows the current status of nuclear power plants at each site, with the number of operating reactors and their installed capacity in parentheses.

Table 2: Status of Nuclear Power Plants (NPPs)
(Unit: Megawatts)

Reactor Site	In Operation
Kori	4 (3,137)
Wolsong	4 (2,739)
Yonggwang	6 (5,900)
Ulchin	6 (5,900)
Total	20 (17,716)

NUCLEAR POWER CONSTRUCTION AND PLANNING

¶13. As shown in Table 3 below, Korea has plans to build eight new nuclear power plants (NPPs) over the next 10 years. Of the planned eight reactors, KHNP has already obtained construction permits for Shin-Kori 1&2 and Shin-Wolsong 1&2 (Shin means new -- the sites are adjacent to the existing Kori and Wolsong sites). All of the four reactor types are 1,000-MWe PWRs.

¶14. Groundbreaking for construction of Shin-Kori 1 and 2 was held in October 2005, and they are scheduled for completion in 2010 and 2011, respectively. Groundbreaking for Shin-Wolsong 1 and 2 will occur in July this year, aiming at commercial operation in 2011 and 2012, respectively.

¶15. The remaining four advanced light water reactors (1,400 MWe-class ALWRs, also called the APR1400), are still on the drawing table, but are projected to be built at Shin-Kori and Shin-Ulchin (two units at each site) by 2014 and 2016, respectively. KHNP expects to have the main contract concluded within this year.

Table 3: NPPs under Construction and Planned

Project		Reactor Type	Capacity (MW)	Plant Type	Commercial Operation
Shin-Kori	No.1	PWR	1,000	OPR1000	2010
	2	PWR	1,000	OPR1000	2011
	3	ALWR	1,400	APR1400	2013
	4	ALWR	1,400	APR1400	2014
Shin-Wolsong	1	PWR	1,000	OPR1000	2011
	2	PWR	1,000	OPR1000	2012
Shin-	5	ALWR	1,400	APR1400	2015

Note: PWR: Pressurized Water Reactor
ALWR: Advanced Light Water Reactor
OPR: Optimized Power Reactor
APR: Advanced Power Reactor

RADIOACTIVE WASTE REPOSITORY CONSTRUCTION

¶16. After 19 years of stymied efforts, the Korean government finally selected a site for the nation's first centralized radioactive waste repository (for low and intermediate-level nuclear waste only) in March ¶2005. The choice was confirmed by a referendum among local residents, despite opposition by anti-nuclear activists, after promises of large-scale development funding for the winning jurisdiction.

¶17. KHNP, responsible for managing the nation's radioactive waste, will build the facility on two million square meters located in Gyeongju, near the Shin-Wolsong site. In the initial stage, a 100,000-drum capacity facility is to be completed by the end of ¶2009. It will eventually be expanded to store 800,000 drums of radioactive waste.

CONTINUING INVESTMENT IN R&D

¶18. Lee asserted that Korea will continue to increase its R&D spending on priority projects such as the system-integrated modular advanced reactor (SMART) program, development of the next-generation nuclear power reactor (working with international partners in the Generation IV Nuclear Forum), and hydrogen production using nuclear energy. The SMART reactor, designed for both electricity generation and seawater desalination, is expected to be commercialized from 2009, if everything goes as planned.

LOOKING FOR OVERSEAS MARKETS

¶19. As a company with substantial experience in building and operating nuclear power plants, Lee said, KHNP is willing to cooperate with other countries in training foreign specialists. KHNP also hopes to advance into niche markets overseas in nuclear power operation and maintenance.

CLEAN ENERGY, BUT CHALLENGES STILL TO BE OVERCOME

¶20. Lee underlined the clean nature of nuclear power, asserting that a 1,000 MW capacity nuclear power unit produces 7.5 million fewer tons of carbon dioxide each year than a thermal power plant using coal. In 2005, nuclear generation in Korea reached about 147 billion kilowatts hour (KWh). If this much energy had been generated with coal, 140 million tons of additional carbon dioxide would have been emitted, Lee said.

¶21. Nonetheless, Lee stated that Korea, like other advanced nuclear countries, faces a variety of challenges, including NGO opposition to expanding nuclear power, issues of safety and security, local opposition to the siting of nuclear facilities, competition from other energy sources, and the development of nuclear scientists and specialists.

ENHANCING PUBLIC ACCEPTANCE OF NUCLEAR POWER

¶22. In an attempt to generate a stronger social consensus, the Korean government plans to launch a new high-level policymaking body, to be dubbed the State

Energy Commission, in September 2006. The State Energy Commission, chaired by the President and including various Cabinet ministers among its 25 members, will be charged with formulating a 20-year basic energy plan aimed at promoting stable energy supplies. One of the issues it will address is the treatment of high-level radioactive waste, left out of the Gyeongju plan in order to assure public acceptance. The formation of the commission is linked to the implementation of the Basic Act on Energy that will take effect in September this year.

COMMENT

123. If Lee's cautious prediction of a global nuclear renaissance proves correct, Korea will be well-placed to benefit. The steady construction of new plants in Korea has given Korean manufacturers such as Doosan Heavy Industries a depth of current expertise and manufacturing capacity that is matched in few other places around the world. End Comment.

VERSHBOW